

REMARKS

Reconsideration and allowance in view of the above amendments and following remarks is requested. Claim 1 has been amended to recite the limitation that the electrolyte is based on sulfur dioxide which was previously found in dependent claim 19. New claim 32 depends from claim 1 and requires that the porous structure does not form a composite with the substrate of the negative electrode. Support for claim 32 is found at page 12, lines 13-16, of the Present Application.

Allowable Subject Matter

Applicants thank the Examiner for indicating claim 13 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Rejections Under 35 U.S.C. § 103(a)

Claims 1, 3-5, 7, 9, 10 and 20-27 were rejected under 35 U.S.C. § 103(a) as obvious over JP 60-230367 ("JP '367"). Applicants respectfully traverse each of the rejections and submit that JP '367, taken alone or in combination with other art or the knowledge of one having ordinary skill in art, does not disclose or suggest each and every feature of amended claim 1, or dependent claims 3-5, 7, 9, 10 and 20-27 which depend from claim 1.

JP '367 fails to disclose or suggest that "the porous structure is determined by the size and shape of structure-forming solid particles" as required by claim 1. JP '367 discloses making a layer of a porous non-conductive material on an electrode, however all of the embodiments describe coating or modifying the surface the electrode using techniques such as sintering particles, chemical erosion, electrolytic oxidation, and ion sputtering. (JP '367, p.5). None of these techniques would result in the porous structure being determined by the size and shape of the structure-forming solid particles, rather each of these techniques results in changes to the size and shape of the pores and the solid matter from heating, chemical reaction, etc., which results in

the porous structure being determined by the technique used to form the layer, rather than the size and shape of the particles.

Furthermore, amended claim 1 now requires an electrolyte based on sulfur dioxide. This limitation was previously found in claim 19. Claim 19 was rejected under 35 U.S.C. § 103(a) as obvious over JP '367 in view of WO 00/44061 to Hambitzer et al. The Examiner asserts that U.S. Patent 6,709,789 to Hambitzer et al. ("the '789 patent") is an English language equivalent of WO 00/44061. Claim 19 has been cancelled. In rejecting claim 19 the Examiner concedes that JP '367 fails to disclose using an electrolyte based on sulfur dioxide, but states that it would have been obvious to use the sulfur dioxide electrolyte of the '789 patent because it discloses "that the sulfur dioxide provides a safety capability by reacting with lithium to form a covering layer of lithium sulfate." This statement, however mischaracterizes the cited portion of the '789 patent. Specifically, this portion of the '789 patent (Col. 6, Line 57, et seq.) describes the reaction of lithium with sulfur dioxide to form a covering layer on the negative electrode as an example of a safety-critical (i.e., dangerous) reaction that can lead to a dangerous thermal-runaway condition under certain conditions, such as elevated temperatures. In other words, the reaction of lithium with sulfur dioxide in the electrolytic solution does not provide a safety capability as suggested in the Office Action, but rather creates a dangerous condition which would teach away from utilizing a sulfur dioxide electrolyte.

JP '367 describes an electrolytic solution prepared by a variety of different materials dissolved in an electrolytic solution and enumerates a plurality of possible salts (including several active metals and "counter ions") dissolved in a typical solvent of organic batteries such as propylene carbonate, γ -butyrolactone, dimethoxy ethane, THF, dioxane and acetone. (JP '367, pp. 6-7). No inorganic electrolyte is mentioned at all in JP '367, much less one based on

sulfur dioxide.

For all of the reasons explained above, amended claim 1 is not obvious over the teachings of the JP '367, taken alone or in combination with other art or the knowledge of one having ordinary skill in art. Applicants respectfully request withdrawal of the rejection of claim 1. Claims 3-5, 7, 9, 10 and 20-27 depend from claim 1 which is believed to be allowable for the reasons discussed above. Applicants submit that claims 3-5, 7, 9, 10 and 20-27 are allowable as depending from an allowable base claim and respectfully request withdrawal of these rejections.

Claims 15-19 and 28-31 were rejected under 35 U.S.C. § 103(a) as obvious over JP '367 in view of the '789 patent. Claim 19 has been cancelled and its subject matter incorporated into independent claim 1. As described above, the JP '367 patent fails to disclose or suggest several limitations required in amended claim 1, from which claims 15-18 and 28-31 depend. The '789 patent fails to remedy the deficiencies of the JP '367 with respect to amended claim 1 and applicants submit that claims 15-18 and 28-31 are allowable as depending from an allowable base claim and respectfully request withdrawal of these rejections.

Claims 11 and 12 were rejected under 35 U.S.C. § 103(a) as obvious over JP '367 in view of Aihara et al. (2002/0102456). As described above, the JP '367 patent fails to disclose or suggest several limitations required in claim 1, from which claims 11 and 12 depend. Aihara et al. fails to remedy the deficiencies of the JP '367 with respect to claim 1 and applicants submit that claims 11 and 12 are allowable as depending from an allowable base claim and respectfully request withdrawal of these rejections.

New dependent claim 32 requires that the porous structure does not include an in situ forming of composite with the substrate of the negative electrode. At pages 12-13 of the present application, several methods of forming the porous structure are described. In a first example,

the solid particles may be poured into the cell in a dry form or as a suspension in a volatile liquid which is later evaporated. In a second example, the solid particles are processed into a layer using a binder material, which can be removed later by heating. The porous layer may thereafter be assembled into the cell. One of skill in the art would understand that in both of these methods, there is no in situ formation of a composite with the substrate of the negative electrode. On the other hand, JP '367 discloses composite structures of a conductive base and a layer of porous, non-conductive materials, which can be prepared in situ using one of two methods. In the first method, the porous layer is formed by treating the surface of the conductive layer using a surface porosifying technique, such as sintering particles, chemical erosion, electrolytic oxidation. (JP '367, p. 5). In the second method, a conductive base and a porous non-conductive material are put together using a technique such as vapor deposition of metal, impregnation of fused metal and ion plantation. (JP '367, p. 5-6). The end result of both surface porosifying techniques is a composite of the porous, non-conductive substrate and the negative electrode. Accordingly, JP '367 does not disclose or suggest a battery in which the porous structure does not form an in situ generated composite with the substrate of the negative electrode and claim 32 is also allowable.

Conclusion

In view of the foregoing amendments and remarks, Applicants submit that the rejection of each of claims 1, 3-5, 7, 9-12, 15-18 and 20-31 is improper because the cited prior art fails to disclose or suggest each and every element of the claims. Reconsideration and allowance are requested. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

In the event that this paper is not timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account No. 02-2135.

Respectfully submitted,

/Ryan P. Wallace/
Ryan P. Wallace
Registration No. 60,212
Attorney for Applicants
ROTHWELL, FIGG, ERNST & MANBECK
1425 K Street, N.W., Suite 800
Washington, D.C. 20005
Telephone: (202) 783-6040